

REMARKS

Claims 76-94 are pending in this application. Claims 76 and 77 have been amended. Claims 84-94 have been added. No new matter has been added

Claims 76-83 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Miyata et al. (U.S. Patent No. 6,333,258) ("Miyata"). This rejection is respectfully traversed.

The claimed invention relates to an integrated circuit structure. Amended independent claim 76 recites an "integrated circuit structure" comprising *inter alia* "a first insulating layer comprising SILK material with a dielectric constant of about 2.65 at 100 kHz provided over a semiconductor substrate and contacting at least a portion of a metal layer provided within said semiconductor substrate, said first insulating layer having a thickness of about 4,000 Angstroms to about 30,000 Angstroms." Independent claim 76 also recites, "a second insulating layer comprising NANOGLASS material with a dielectric constant of about 3.5 at 100 kHz provided over and in contact with said first insulating layer, said second insulating layer having a thickness of about 100 Angstroms to about 2,000 Angstroms." Independent claim 76 further recites, "at least a first opening within said first insulating layer, said first opening having a first portion with a first width and a second portion with a second width, said first width being different from said second width."

Miyata discloses a "manufacturing method for forming a dual damascene structure in which the effective permittivity of an inter-layer insulating film is lowered without an etching mask for forming a contact hole, which is otherwise formed in the inter-insulating film." (Abstract). Miyata also discloses "the inter-layer insulating film may well be formed by carrying out the step of forming a first inter-layer insulating film; the step of forming an etching stopper layer made of an insulating film, on the first

inter-layer insulating film; and the step of forming a second inter-layer insulating film on the etching stopper layer.” (col. 3, lines 34-39).

In the present case, Miyata fails to disclose, teach or suggest all limitations of amended independent claim 76. More specifically, Miyata fails to disclose, a “second insulating layer ... provided over and *in contact with* said first insulating layer,” as amended independent claim 76 recites (emphasis added). The inter-layer insulating film of Miyata includes an etching stopper layer between the first and second insulating layers and therefore, the second insulating layer in Miyata cannot be in contact with the first insulating layer.

Additionally, the subject matter of claims 76-83 would not have been obvious over Miyata. Specifically, the Office Action fails to establish a prima facie case of obviousness. Courts have generally recognized that a showing of a prima facie case of obviousness necessitates three requirements: (i) some suggestion or motivation, either in the references themselves or in the knowledge of a person of ordinary skill in the art, to modify the reference or combine the reference teachings; (ii) a reasonable expectation of success; and (iii) the prior art references must teach or suggest all claim limitations. See e.g., In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Rouffet, 149 F.3d 1350, 1355 (Fed. Cir. 1998); Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc., 75 F.3d 1568, 1573 (Fed. Cir. 1996).

Furthermore, the omission of an element and retention of its function is an indicia of unobviousness. In re Edge, 359 F.2d 896 (CCPA 1966); M.P.E.P. § 2144.04(II)(B). The disclosure in Miyata requires an etching stopper layer 42 between the two layers of insulating material 41, 43 in the inter-layer insulating film 12. (col. 8, line 57 – col. 9, line 43). Although, the etch stop layer in Miyata can be formed at a smaller thickness than those in the prior art, it is still necessary. (col. 9, lines 10-19).

The present invention does not include an etching stopper layer, but instead uses the relative characteristics of the materials of the first and second insulating layers, to act as the etch stop. Therefore, the etching stopper layer of Miyata is removed from the present invention, but the function of the etch stop is retained.

Additionally, "references that teach away cannot serve to create a *prima facie* case of obviousness." McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1353-4 (Fed. Cir. 2001), *citing* In re Gurley, 27 F.3d 551, 553 (Fed. Cir. 1994). The claimed invention focuses on timed etching with materials selected for the insulating layers so that the etchant available for each has only a small etch rate relative to the other material. Miyata does not suggest or disclose choosing materials for the first and second layers of insulating material in such a way that the etchant available for each has only a small etch rate relative to the other material, *i.e.* SILK and NANOGLASS. In fact, Miyata states that "the first inter-layer insulating film 41 and the second inter-layer insulating film 43 are formed of the same kind of insulating material. However, the first inter-layer insulating film 41 and the second inter-layer insulating film 43 can also be formed of different kinds of insulating materials as long as the materials *are etched under the same etching conditions.*" (Col. 12, Lines 10-16, emphasis added). This would in fact suggest the opposite result as that obtained in the present application. Miyata suggests that the materials for the first and second inter-layer insulating materials should be chosen in such a way that they can be etched by the *same* etchant, not by different etchants. Miyata does not disclose using SILK and NANOGLASS in the same dielectric structure and, although both materials are disclosed as possible insulating layer materials, Miyata teaches against combining them as the first and second inter-layer insulating films of the same dielectric structure because of the requirement that the materials used for the first and second inter-layer insulating materials be etched under the same conditions. As disclosed in the present application, "SILK and NANOGLASS

may be individually etched by a respective etchant which, while readily etching one insulating material, will have only a very small, negligible etch rate for the other insulating material.” (Specification, paragraph [0045]).

For at least the reasons above, the Office Action fails to establish a *prima facie* case of obviousness, and withdrawal of the rejection of claims 76-83 is respectfully requested.

Claims 84-94 have been added and are patentable over the references of record, including Miyata, Hasegawa et. al. (US Patent No. 6,593,246) (Hasegawa), and Baklanov et. al (US Patent No. 6,593,251) (Baklanov). New independent claim 84 recites an integrated circuit structure comprising, in part, “a first insulating layer with a dielectric constant lower than 4.0 provided over a semiconductor substrate and contacting at least a portion of a metal layer provided within said semiconductor substrate.” Independent claim 84 also recites “a second insulating layer with a dielectric constant lower than 4.0 provided over and in contact with said first insulating layer.” Additionally, independent claim 84 recites “at least a first opening within said first insulating layer, said first opening having a first portion with a first width and a second portion with a second width, said first width being different from said second width.” Finally, claim 84 recites “said first and second insulating layers are formed of materials which can be selectively etched relative to each other.”

Miyata does not disclose, teach or suggest “a second insulating layer with a dielectric constant lower than 4.0 provided over and *in contact with* said first insulating layer.” The inter-layer insulating film of Miyata includes an etching stopper layer between the first and second insulating layers and therefore, the second insulating layer in Miyata cannot be in contact with the first insulating layer. Additionally, claim 84 would not be obvious over Miyata for the reasons discussed above, in relation to claim

76, regarding the relative characteristics of the two insulating layers providing the function of the etch stop layer.

Hasegawa does not disclose, teaches or suggests "at least a first opening within said first insulating layer, said first opening having a first portion with a first width and a second portion with a second width, said first width being different from said second width." Hasegawa teaches that the "via hole 26" (which would arguably correspond to the "first opening" of the claimed invention) is etched within the "first film 13" (which would arguably correspond to the "first insulating layer" of the claimed invention). However, as described and illustrated by Hasegawa, via hole 26 has a constant width and diameter.

Baklanov relates to a method of producing a porous oxygen-silicon insulating layer and does not discuss the use of this layer in an integrated circuit structure and therefore cannot disclose the relative structure of the insulating layers.

For at least these reasons, new claims 84-94 are patentable over the references of record. Prompt examination of new claims 84-94 is requested.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

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